

New species of *Cauchas* Zeller (Lepidoptera : Adelidae) from the Altai and Tianshan Mountains (1)

Michail V. KOZLOV

Laboratory of Ecological Zoology, Department of Biology, University of Turku, FIN-20500 Turku, Finland

Summary

Three species of the genus *Cauchas* Zell. superficially resembling *C. rufifrontella* Scop. are described from material collected by Finnish lepidopterologists in montane regions of the Central Palaearctic. *C. mikkolai* sp. n. was taken in the Altai; *C. talgarella* sp. n. and *C. elevatella* sp. n. in the Tianshan Mountains, Zailiskiy Alatau (Kazakhstan).

Zusammenfassung

Drei Arten der Gattung *Cauchas* Zell., äusserlich ähnlich *C. rufifrontella* Scop., aus den Aufsammlungen der Finnischen Lepidopterologen in den Bergregionen der zentralen Palearktis werden neu beschrieben: *C. mikkolai* sp. n. von Altai, *C. talgarella* sp. n. und *C. elevatella* sp. n. von Zailiskiy Alatau (Kazakhstan).

Résumé

Description de trois espèces nouvelles du genre *Cauchas* Zell. ressemblant extérieurement à *C. rufifrontella* Scop., provenant des récoltes de lépidoptérogues finlandais dans les montagnes de la région paléarctique centrale: *C. mikkolai* sp. n. de l'Altai, *C. talgarella* sp. n. & *C. elevatella* sp. n. des montagnes du Tianshan, Zailiskiy Alatau (Kazakhstan).

Introduction

The full generic rank of *Cauchas* Zeller, 1839, previously considered a subgenus of *Adela* Latreille, 1796, was established by Nielsen (1980). This genus includes 9 Palaearctic (Nielsen & Johansson, 1980) and 14 Nearctic species (including some undescribed; D. R. Davis, pers. comm.). The most eastern record of *Cauchas* in Eurasia was reported

(1) Report no. 11 from the joint Russian-Finnish entomological expeditions to Siberia (cooperative project no. 20 between the Academy of Finland and the Russian Academy of Sciences).

from Uzbekistan (cf. Zagulajev, 1978 and Nielsen & Johansson, 1980). No material had been obtained from Kazakhstan and Siberia before the collecting trips of Finnish lepidopterologists.

Three species of *Cauchas* described below resemble *C. rufifrontella* Scop. both habitually and in general traits of the male genital structure. Since the comparative investigation of Palearctic species included in *Cauchas* by Nielsen & Johansson (1980) showed heterogeneity of this group, the taxonomical position of the described species will be discussed elsewhere (Kozlov in prep.).

Male genital structures in the Lepidoptera are usually investigated after mounting on slides. Since the strongly sclerotized genitalia of incurvariids form almost a circular tube, different dissection techniques have been used (Davis, 1967; Razowski, 1978; Nielsen, 1980). In my opinion, there are at least two drawbacks in such dissections. First, it is impossible to reconstruct the third dimension of the genital complex, where the position of any structure is not less important than its shape. Second, it is very difficult to use figures of dissected genitalia for the determination without mounting specimens in the same way. In addition, if the whole preparations are figured only from the lateral (Zagulajev, 1978) or ventral (Okano, 1957) sides, some of the important features are not visible. Thus, I did not dissect the male genitalia, and following Yasuda (1957) they are figured *in toto* both from the ventral and lateral sides. If necessary for clarity, the left valva is not figured. The genitalia are kept in glycerine in small tubes pinned together with the moth.

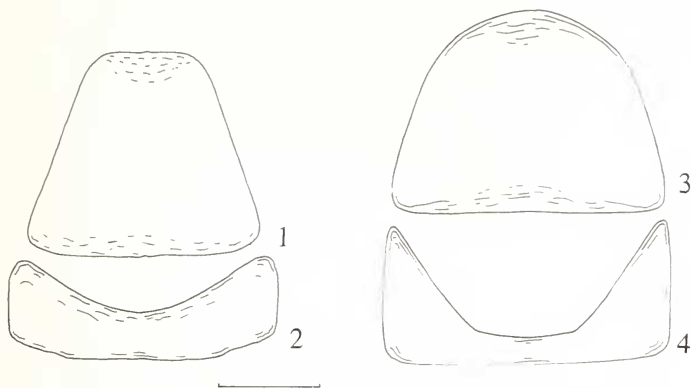
The type material is kept in the collections of the Finnish Museum of Natural History, Helsinki, Finland (FMNH) and the Zoological Institute, Russian Academy of Sciences, St. Petersburg, Russia (ZIN).

Cauchas mikkolai sp. n. (Figs 1, 2, 5, 6, 9, 10, 15)

HOLOTYPE: ♂, USSR, SW-Altai, Kuragan valley, 15 km S Katanda, 23-25.7.1983, Exp. Mikkola, Hippa & Jalava leg.; taiga, 1200 m; in FMNH. Paratypes: 16 ♂♂, 4 ♀♀, same label as holotype; in FMNH. 3 ♂♂, 1 ♀, same label as holotype; in ZIN.

ETYMOLOGY: Named after Dr Kauri Mikkola, Finnish entomologist, the leader of the Russian-Finnish cooperative project, who was involved in the collecting of the type material.

DIAGNOSIS: Differs from *rufifrontella* Scop. by the relatively shorter vinculum (about $1.6 \times$ length of valva), and from *breviantennella*



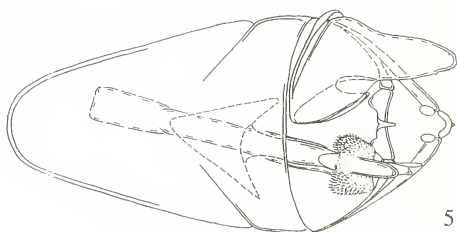
Figs 1-4. Male abdominal sclerites : tergum VIII (1,3) and sternum VIII (2,4). 1,2 — *Cauchas mikkolai* sp.n., holotype; 3,4 — *C. talgarella* sp.n., holotype. Scale: 0.25 mm.

Nielsen & Johansson, 1980, by the long tegumen (its apex is on the same level as the apex of valva).

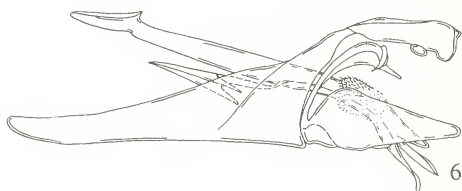
MALE: Wingspan 9.8-11.6 mm. Head with long raised hair-like scales, brownish-yellow on vertex and black on frons. Maxillary palpi short. Labial palpi short, dark brown. Length of antenna about 1.2-1.3 × length of forewing. Scapus and basal part of flagellum (about 0.6 of its length) cupreous brown, apical part light grey. Tegulae and thorax uniformly brassy-green, with bronzy shimmer. Forewing elongate (length/width ratio 3.2-3.3), same colour as thorax; cilia bronze around apex, greyish-bronze on termen. Hindwing greyish-cupreous, costal area (overlapped by forewing in flight) light grey; cilia brownish-grey. Epiphysis on fore tibia articulating at 3/5 from base of tibia and reaching its apex. Hind tibia with unusually dense cover of both brownish-grey scales and dark grey hairs; proximal pair of spurs situated at about middle of tibia. Abdomen dark brown.

FEMALE: Wingspan 10-14 mm. Head with brownish-yellow scales slightly darker than those in males. Antenna same length as forewing. Otherwise similar to male.

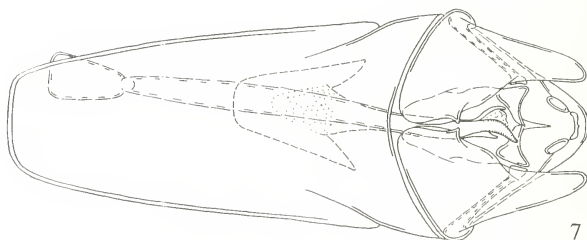
MALE GENITALIA: Abdominal sclerites uniformly sclerotized. Tergum VIII (Fig. 1) slightly shorter than maximal width of anterior margin, tapering posteriorly; posterior margin straight, about 2 times shorter



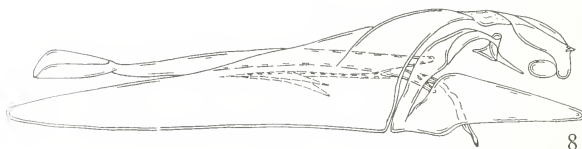
5



6



7



8

Figs 5-8. Male genitalia : ventral view (5,7) and lateral view (6,8). 5,6 — *Cauchas mikkolai* sp.n., holotype ; 7,8 - *C. talgarella* sp.n., holotype. Scale : 0.25 mm.

than anterior. Sternum VIII (Fig. 2) narrow, slightly widening laterally; anterior margin straight medially, slightly sloped laterally; posterior margin uniformly concave. Tegumen (Fig. 5) almost triangular, with membranous middle part; tip rounded, with small longitudinal ridge. Socii small, oval, well sclerotized. Vinculum broad, about 1.6 times longer than valva. Valva (Figs. 5, 6) long, wide basally and narrow apically, tip rounded. Dorsal margin slightly emarginate, ventral margin convex medially, basally with distinct blunt hook-like extension with pointed apex. Transtilla with medial posterior process slightly longer than triangular latero-medial anterior processes; width of transtilla about $4 \times$ length of medial process. Aedeagus long, about twice length of valva; broad membranous band near tip covered by pointed, sclerotized teeth; tip with three separate lobes. Juxta short (about $0.5 \times$ length of aedeagus), broad at base, anterior end shaped like arrow-head (Fig. 5). Base of arrow-head equal to its length.

FEMALE GENITALIA: Tergum VII (Fig. 9) triangular, 1.2 times longer than its width at base; lateral margins posteriorly slightly concave; tip rounded. Sternum VII (Fig. 10) 1.1 times longer than its maximal width; anterior margin rounded; lateral margins straight. Tuberculate plates absent. Distal tip of ovipositor without distinctive teeth. Apophyses posteriores slightly longer than apophyses anteriores (Fig. 15). Venter VIII membranous; ventral medial keel on dorsal VIII not reaching sclerotized zone. Apophyses anteriores convex apically; the narrowest part of dorsum VIII situated at about $1/3$ from its apex. Corpus bursae not distinctly separate from ductus bursae, both without internal spines. Vestibulum strongly folded; internal vaginal sclerite not visible (only slightly sclerotized oval area visible).

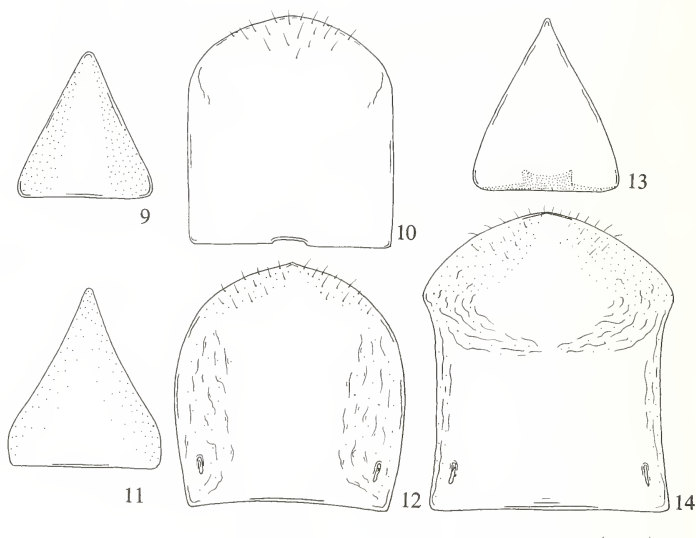
BIOLOGY: The moths were swarming in sunshine on a grazed clearing of taiga forest in a deep S-N directed river valley (K. Mikkola, pers. comm.).

DISTRIBUTION: Known from the type locality only: Russia, SW-Altai, Kuragan valley (locality 5b in the map published by Kuznetsov & Jalava 1988).

Cauchas talgarella sp. n. (Figs 3, 4, 7, 8, 11, 12, 16)

HOLOTYPE: ♂, USSR $43^{\circ}05'N$ $77^{\circ}15'E$, Kazakhstan, Zailiskiy Alatau, Alma-Atinskij Nat. P., 23.6.1990, L. Kaila & K. Mikkola leg.; 1700-2000 m, *Picea*/meadow; in FMNH.

PARATYPES: 1 ♂, same locality as holotype, 27.6.1990, L. Hulden & L. Kaila leg.; 1900-2300 m, *Picea*/meadow; 1 ♀, same label as previous paratype; in FMNH.

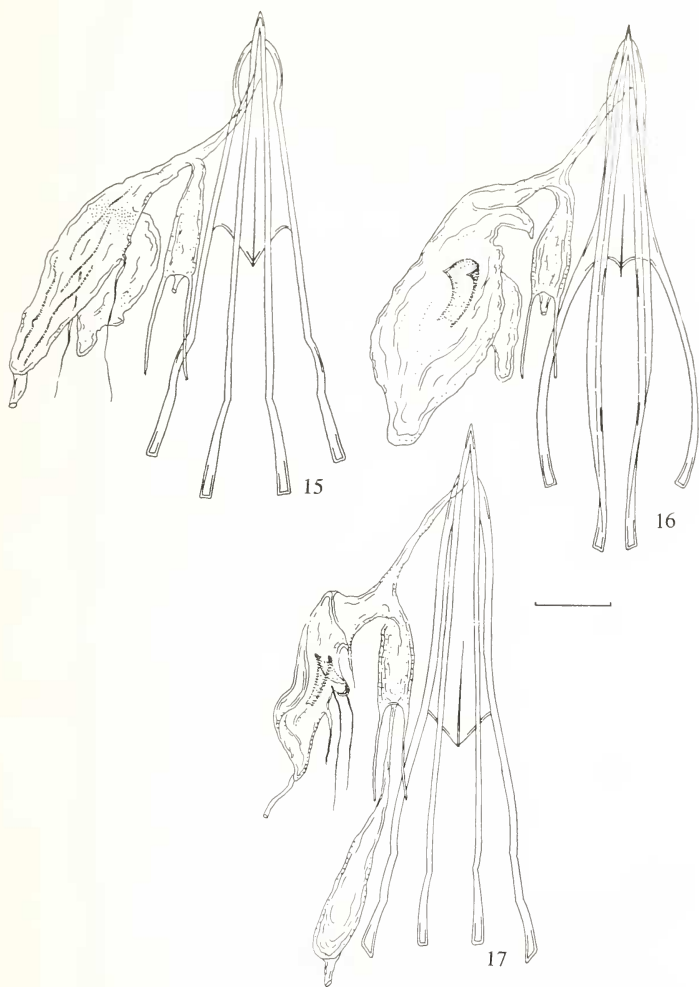


Figs 9-14. Female abdominal sclerites : tergum VII (9,11,13) and sternum VII (10,12,14). 9,10 — *Cauchas mikkolai* sp.n., paratype ; 11,12 — *C. talgarella* sp.n., paratype ; 13,14 — *C. elevatella* sp.n., holotype. Scale : 0.25 mm.

ETYMOLOGY : Named after Mount Talgar in the vicinity of the type locality.

DIAGNOSIS : Resembles *brunnella* Nielsen & Johansson, from which it is separated by its narrower wings, small pointed lobe at the base of ventral margin of valva and broadly rounded apex of juxta in the male genitalia.

MALE : Wingspan 9.8-11.0 mm. Head with long raised hair-like black scales on vertex and appressed dark-brown scales on frons. Maxillary palpi very short. Labial palpi short, dark brown. Length of antenna about $1.8 \times$ forewing length. Scapus and flagellum cupreous brown, apically grey. Tegulae and thorax dark brown with brassy-green sheen. Forewing broad (length/width ratio 3.2-3.3), dark brown, with prominent brassy-green sheen along dorsum and cupreous-violet sheen costally and apically. Cilia dark brown, cupreous around apex and brown-grey on termen. Hindwing slightly lighter, brown with cupreous sheen, with narrow border of bronze scales around apex and along



Figs 15-17. Female genitalia. 15 — *Cauchas mikkolai* sp.n., paratype ; 16 — *C. talgarella* sp.n., paratype ; 17 - *C. elevatella* sp.n., holotype. Scale : 0.25 mm.

dorsum ; costal area (overlapped by forewing in flight) light grey ; cilia dark brown. Fore tibia with epiphysis articulating at about $3/5$ of its length not reaching tip of tibia. Hind tibia covered by long brown hairs, with proximal pair of spurs situated approximately at middle of tibia. Abdomen dark brown.

FEMALE : Wingspan 11.4 mm. Antenna shorter than in male (about $1.2 \times$ forewing length). Forewing narrower (length/width ratio 3.5) ; otherwise similar to male.

MALE GENITALIA : Abdominal sclerites uniformly sclerotized. Tergum VIII (Fig. 3) uniformly rounded apically, length about $3/4 \times$ width of anterior margin. Sternum VIII (Fig. 4) very narrow medially, strongly (about $4-5 \times$ middle part) widening laterally. Anterior margin straight ; posterior margin straight medially (about $1/3 \times$ total width), then abruptly extending caudally. Tegumen (Fig. 7) trapeziform, with membranous middle part. Socii small, oval, well sclerotized. Vinculum broad, about $2 \times$ valva. Valva (Figs 7, 8) slightly longer than tegumen, broad basally and narrow apically, tip rounded. Dorsal margin of valva slightly emarginate, ventrally with short (about $1/3 \times$ total length of valva), well-sclerotized pointed lobe at base. Ventral zone of valva with long setae. Transtilla with short medial posterior process ; latero-medial anterior processes caudally slightly bulging out ; width of transtilla is about $2.4 \times$ of medial process length. Aedeagus long, with gradual extension basally. Juxta short (about $0.4 \times$ aedeagus's length), broad basally, anterior tip shaped like arrow-head, with broadly rounded apex. Base of arrow-head is about $0.9 \times$ length (Fig. 11).

FEMALE GENITALIA : Tergum VII (Fig. 11) triangular, length equal to basal width of tergum ; lateral margins straight ; tip rounded. Length of sternum VII (Fig. 12) equal to maximal width ; anterior margin rounded ; lateral margins slightly concave. Tuberculate plates oval, situated two times closer to lateral margin than to apical one. Distal tip of ovipositor without distinctive teeth. Apophyses posteriores longer than apophyses anteriores (Fig. 16). Venter VIII membranous ; ventral medial keel on dorsal VIII slightly prominent. Corpus bursae not distinctly demarcated from ductus bursae, both without internal spines. Vestibulum strongly folded ; internal vaginal sclerite concave, well sclerotized laterally ; caudal margins pointed.

BIOLOGY : Collected in the day time on meadows in a spruce (*Picea*) forest of the southern (shady) slope of the valley (K. Mikkola, pers. comm.).

DISTRIBUTION : KNOWN from the type locality only : Kazakhstan, Zailiskiy Alatau, Alma-Atinskij National Park.

Note : Among the described species, *talgarella* is most closely related to *brunnella* Nielsen & Johansson. The female of *talgarella* can not be considered as the unknown female of *brunnella* because of the smaller size and more narrow forewing (length/width ratio in *brunnella*, as measured on the figure, is about 2.9). Moreover, according to the original description (Nielsen & Johansson, 1980), *brunnella* is similar to *leucocerella* Scop. and *albiantennella* Burmann in having the base of hind wing distinctly paler than margin; this trait is not found on the hind wing of *talgarella*.

Cauchas elevatella sp. n. (Figs 13, 14, 17)

HOLOTYPE : ♀, USSR 43°05'N 77°15'E, Kazakhstan, Zailiskiy Alatau, Alma-Atinskij Nat. P., 8.7.1990, L.Kaila & K. Mikkola leg. ; 2750 m, meadow ; in FMNH.

ETYMOLOGY : Inhabiting montane areas at high elevation.

DIAGNOSIS (female only) : Differs from *brunnella* Nielsen & Johansson by the narrow bronze-green forewings, and from *talgarella* sp.n. also by the slightly shorter antenna, black head and position of the tuberculate plates on the female sternum VII.

FEMALE : Wingspan 12.6 mm. Head with long raised hair-like scales which are brownish grey on neck but black on vertex, on upper part of frons and around eyes; lower part of frons with appressed black scales. Maxillary palpi very short. Labial palpi short, dark brown. Length of antenna about 1.1 × forewing length. Scapus and flagellum cupreous brown, apically pale grey. Tegulae and thorax dark brown, with brassy-green sheen. Forewing narrow (length/width ratio 3.5), bronze-green, with a prominent brassy-green sheen. Cilia dark brown around apex and greyish-brown on termen. Hindwing slightly lighter, dark brown with cupreous sheen, with narrow border of bronze scales around apex and along dorsum; costal area (overlapped by forewing in flight) dark grey; cilia dark brown. Fore tibia with epiphysis articulating before middle and evidently not reaching apex of tibia. Hind tibia covered by long brown hairs, with proximal pair of spurs situated at about 1/2 of tibial length. Abdomen dark brown.

FEMALE GENITALIA : Tergum VII (Fig. 13) triangular, 1.1 × longer than basal width; lateral margins posteriorly slightly concave; tip rounded. Sternum VII (Fig. 14) 1.2 × longer than maximal width; anterior margin rounded; lateral margins almost straight, slightly depigmented. Tuberculate plates elongate, situated at about same distance from lateral and basal margins. Distal tip of ovipositor without distinctive teeth.

Apophyses posteriores slightly longer than apophyses anteriores (Fig. 17). Venter VIII membranous; ventral medial keel on dorsal VIII not reaching sclerotized zone. Corpus bursae not distinctly demarcated from ductus bursae, both without internal spines. Vestibulum strongly folded; internal vaginal sclerite prominent, well sclerotized laterally.

BIOLOGY: Collected on alpine meadow at the timberline (K. Mikkola, pers.comm.).

DISTRIBUTION: Known from the type locality only: Kazakhstan, Zailiskiy Alatau, Alma-Atinskij National Park.

Note: Since the females of the two *Cauchas* species were collected at the same locality in Zailiskiy Alatau, their affinity to the males representing a single species is problematical. The following reasons were taken into account separating the specimen described above from the sample of *talgarella*: 1♂ and 1♀ of *talgarella* were caught at the same place (according to the collector's notes) on the same day within the forest zone, while the single female of *elevatella* was collected significantly higher up on alpine meadows; the female considered to be *talgarella* is of the same size and practically of the same tint of forewing colour as the males, while *elevatella* is larger and greener. It should be noted that the hair-like scales on the vertex of the *talgarella* female differ in colour from those of the male, while in *elevatella* they are of the same colour as males of *talgarella*. This fact does not contradict my determination of the females, because males and females of *Cauchas* do sometimes differ in this respect. As stated previously, the female described as *elevatella* cannot be an unknown female of *brunnella* because of the narrow bronze-green forewings (the same tint as in *breviantennella*; see Nielsen & Johansson, 1980, Figs 2-3).

Acknowledgements

I gratefully acknowledge the offer of Dr. K. Mikkola and Mr. J. Jalava to investigate the material collected by the Finnish expeditions, and the invaluable comments of Dr. K. Mikkola to the manuscript. Dr D. R. Davis kindly provided me with the information concerning the North American fauna. Suggestions of two anonymous referees helped me to clarify differences among the species and improve the descriptions.

References

- DAVIS, D. R., 1967. A revision of the moths of the subfamily Prodoxinae (Lepidoptera: Incurvariidae). *Bull. U. S. Nat. Mus.* 255: 1-170.

- KUZNETSOV, V. I. & JALAVA, J., 1988. Soviet-Finnish entomological expeditions to Southern Siberia 1982-1984. 2. Tortricidae (Lepidoptera). *Nota lepid.* 11(2): 126-138.
- NIELSEN, E. S., 1980. A cladistic analysis of the Holarctic genera of adelid moths (Lepidoptera : Incurvarioidea). *Ent. Scand.* 11 : 161-178.
- NIELSEN, E. S., & JOHANSSON, R., 1980. *Cauchas breviantennella* n.sp. from NW Europe and *C. brunnella* n.sp. from Uzbekistan, with a checklist of the Palaearctic *Cauchas* species (Lepidoptera : Adelidae). *Ent. Scand.* 11 : 145-153.
- OKANO, M., 1957. Two new species of the genus *Nemophora* Hofmannsegg from Japan. *Ann. Rep. Gakugei Fac. Iwate Univ.* 11(2) : 63-67.
- RAZOWSKI, J., 1978. Motyle (Lepidoptera) Polski. Cz. III. Heteroneura, Adeloidea. *Monografie fauny Polski* 8 : 1-137.
- YASUDA, T., 1957. Three new species of the Japanese Microlepidoptera. *Tyō to Ga* 8(4) : 38-40.
- ZAGULAJEV, A. K., 1978. 9. Fam. Adelidae. In Medvedev, G.S. (Ed.): *Opredelitel nasekomykh evropeiskoi tshasti SSSR* (Key for the determination of insects of the European part of the U.S.S.R.) 4(1), pp. 92-112. Leningrad.